



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,538	01/23/2002	Tetsunori Kaji	520.35237VX3	4015

20457 7590 09/21/2004

ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-9889

EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,538

Applicant(s)

KAJI ET AL.

Examiner

Michelle Crowell

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42,43,46,47 and 50-55 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42,43,46,47 and 50-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 6, 2004 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 42, 50-52, 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi (U.S. 5,272,417) in view of Lenz et al. (U.S. 5,609,720).

Art Unit: 1763

Referring to Figure 1, column 6, line 25-column 7, line 6, and column 8, line 61-68, Ohmi discloses a plasma processing apparatus comprising: a vacuum processing chamber 105 (col. 6, lines 27-28), a pair of plate electrodes 102, 104 opposite to each other, one of the electrodes 104 being used also as a sample table capable of holding a sample having a diameter of 254 mm containing an insulator film (col. 6, lines 25-27, col. 12, lines 12-15, col. 15, lines 64-68), a gas introducing means capable of introducing a fluorine-containing etching gas into the vacuum processing chamber (col. 6, lines 30-31, col. 8, lines 65-66), and a plasma generating means 111 for forming the introduced gas into a plasma (col. 6, line 68-col. 7, line 5), and means for decreasing the amount of fluorine in the plasma to decrease the amount of fluorine near the sample, the decreasing means comprising an electrode cover 101 comprising a material containing Si or C on the other of the pair of plate electrodes (col. 6, lines 33-43) to react with fluorine and setting a gap between the plate electrodes is set to 30 mm (col. 8, line 24), wherein a pressure in the environment between the pair of flat plate electrodes is set to 0.933 Pa (col. 8, line 25), wherein a high frequency electric power of 100 MHz –250 MHz is applied between the pair of electrodes (col. 8, lines 23-27, col. 4, lines 31-33).

Ohmi discloses a sample diameter of 254 mm; yet, fails to explicitly teach the diameter of the sample being 300 mm or more; however, it is still obvious.

Referring to column 2, lines 35-41, Lenz et al. teaches that it is conventionally known in the art to process a wafer having a diameter of 300 mm. Thus, it would have been obvious to scale up the apparatus of Ohmi to process a wafer having a diameter of 300 mm since it is conventionally known in the art to process wafers having a diameter of 300 mm. Additionally, according to *In Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984),

Art Unit: 1763

cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to scale up/down the apparatus of Ohmi in order to process a sample with a diameter of 300 mm or more.

Regarding the limitation of “fluorine-containing etching gas”, the type of gas used in apparatus claims is considered intended use and therefore is of no significance in determining patentability. Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, the apparatus of Ohmi is capable of providing a fluorine containing etching gas to the sample.

Regarding the limitation of “a pressure condition of 0.5 Pa to 4.0 Pa”, this is considered intended use and therefore is of no significance in determining patentability. The apparatus of Ohmi is capable of providing a pressure condition of 0.5 Pa to 4.0 Pa.

Regarding the limitation of “an insulator film in the sample”, this is considered intended use and therefore is of no significance in determining patentability. The inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” In *re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963). Moreover, the apparatus of Ohmi is capable of processing an insulator film in the sample.

Art Unit: 1763

With respect to claim 50, Ohmi discloses a plasma processing apparatus further including a bias electric power source 110 connected to the one electrode 104 used as a sample table for applying a bias voltage to the sample (col. 6, lines 62-68).

With respect to claim 51, Ohmi discloses a high frequency electric power source of 100 MHz –250 MHz. It is inherently known in the art the high density plasma is generated from high frequency electric power source above 13.56 MHz. Thus, since a 100 MHz-250 MHz power source is used in Ohmi and is within the claimed power source range, it is inherent that the resulting plasma density generated in Ohmi fall between the range of $5 \times 10^{10} \text{ cm}^{-3}$ to $5 \times 10^{11} \text{ cm}^{-3}$.

With respect to claims 54-55, Ohmi discloses a gap set at 30 mm, thus the apparatus of Ohmi is capable of utilizing surface reaction between the pair of electrodes effectively to decrease the amount of fluorine in the plasma near the sample.

Regarding the above apparatus claims, it should be noted that a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

5. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi (U.S. 5,272,417) in view of Lenz et al. (U.S. 5,609,720) as applied to claims 42, 50-52, 54-55 above, and further in view of Sakamoto et al. (U.S. 5,698,062).

The teachings of Ohmi in view of Lenz et al. have been discussed above.

Art Unit: 1763

Ohmi in view of Lenz et al. fails to teach a gas diffusion plate.

Referring to column 5, lines 21-35, Sakamoto et al. teaches a plasma processing apparatus wherein the gas introducing means 26, 21 has a gas diffusion plate 24. It is well known in the art for the upper electrode to include a gas introducing means having a gas diffusion plate in order to uniformly distribute process gases. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the upper electrode of Ohmi in view of Lenz et al. with a gas introducing means having a gas diffusion plate as taught by Sakamoto et al. in order to uniformly distribute process gases.

6. Claim 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi (U.S. 5,272,417) in view of Lenz et al. (U.S. 5,609,720) as applied to claims 42, 50-52, 54-55 above, and further in view of Ishii (U.S. 5,529,657).

The teachings of Ohmi in view of Lenz et al. have been discussed above.

Ohmi in view of Lenz et al. fails to teach a susceptor cover.

Referring to Figures 3-6 and column 4, line 49 – column 5, line 12, Ishii teaches a plasma processing apparatus comprising a susceptible cover 6 comprised of carbon or silicon located adjacent to one of the pair of electrodes 31 (col. 4, lines 50-54, col. 5, lines 9-12). The susceptor cover 6 has a thickness of 2 mm (col. 4, lines 63-65). The susceptor cover directs the plasma to the surface of the wafer. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide one of the pair of electrodes of Ohmi in view of Lenz et al. with the susceptor cover as taught by Ishii in order to direct the plasma to the surface of the wafer.

Art Unit: 1763

7. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi (U.S. 5,272,417) in view of Lenz et al. (U.S. 5,609,720) as applied to claims 42, 50-52, 54-55 above, and further in view of Sakamoto et al. (U.S. 5,698,062).

The teachings of Ohmi in view of Lenz et al. have been discussed above.

Ohmi in view of Lenz et al. fails to teach one of the electrodes having an electrostatic attracting film with a heat transfer gas being supplied between the film and the sample surface.

Referring to Figure 1 and column 5, lines 3-13, Sakamoto et al. teaches a plasma processing apparatus wherein one of the electrodes has an electrostatic attracting film 11 with a heat transfer gas 14 being supplied between the film and the sample surface W in order to secure the sample to the electrode during processing. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide one of the electrodes of Ohmi in view of Lenz et al. with an electrostatic attracting film with a heat transfer gas being supplied between the film and the sample surface as taught by Sakamoto et al. in order to effectively secure the sample to the electrode during processing.

Response to Arguments

8. Applicant's arguments filed July 6, 2004 have been fully considered but they are not persuasive.

Art Unit: 1763

Applicant has argued that Ohmi does not recognize the particular significance of setting the gap between 30 and 60 mm defined by the present independent claim 42 for obtaining the unexpected result of the dramatic decrease of fluorine.

Applicant has argued that the claimed invention provides unexpected results in comparison with Ohmi. The unexpected results are not commensurate with the claimed range of the gap between 30 and 60 mm. Figure 9 of the Appendix describes data wherein the incident flux of F radical can be controlled between the gap ranging from 30 to 120 mm. Additionally, Figure 9 demonstrates the F flux is lower using d-NSF over a gap ranging from 0 to 150 mm. To show unexpected results, the data must be commensurable with claimed range of between 30 and 60 mm.

Applicant has argued that Ohmi provides a much broader range of 20 to 100 mm.

However, Ohmi clearly gives an example of setting a gap between the plate electrodes to 30 mm (col. 8, line 24). Furthermore, Figure 9 of the Appendix describes data wherein the incident flux of F radical can be controlled between the gap ranging from 30 to 120 mm.

Applicant has argued that unexpected results additionally occurs when using an electrode cover made of Si or C to consume the fluorine ions; however, the Appendix gives no mention of the material used for the electrode cover nor the benefits of using Si or C for an electrode cover. Furthermore, Ohmi clearly teaches an electrode cover made of Si or C.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (8:00 - 4:30).

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC *ame*
September 19, 2004

ame
GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700